#4

SEQUENCE LISTING

<110> Fujimoto, Katsumi
Shin, Mei
Kato, Yukio

<120> NOVEL bHLH TYPE TRANSCRIPTION FACTOR GENES DEC2

<130> 06501-101001

<140> US 10/078,650
<141> 2002-02-19

<150> PCT/JP00/03991
<151> 2000-06-19

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aacagcagtt gaac atg gac gaa gga att cct cat ttg caa gag aga cag 170
Met Asp Glu Gly Ile Pro His Leu Gln Glu Arg Gln
1 5 10

tta ctg gaa cat aga gat ttt ata gga ctg gac tat tcc tct ttg tat 218
Leu Leu Glu His Arg Asp Phe Ile Gly Leu Asp Tyr Ser Ser Leu Tyr
15 20 25

atg tgt aaa ccc aaa agg agc atg aaa cga gac gac acc aag gat acc 266
Met Cys Lys Pro Lys Arg Ser Met Lys Arg Asp Asp Thr Lys Asp Thr
30 35 40

tac aaa tta ccg cac aga tta ata gaa aag aaa aga aga gac cga att 314
Tyr Lys Leu Pro His Arg Leu Ile Glu Lys Lys Arg Arg Asp Arg Ile
45 50 55 60

aat gaa tgc att gct cag ctg aaa gat tta ctg cct gaa cat ctg aaa 362
Asn Glu Cys Ile Ala Gln Leu Lys Asp Leu Leu Pro Glu His Leu Lys
65 70 75

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ttg aca act ctg gga cat ctg gag aaa gct gta gtc ttg gaa tta act      410
Leu Thr Thr Leu Gly His Leu Glu Lys Ala Val Val Leu Glu Leu Thr
             80                  85                  90

ttg aaa cac tta aaa gct tta acc gcc tta acc gag caa cag cat cag      458
Leu Lys His Leu Lys Ala Leu Thr Ala Leu Thr Glu Gln Gln His Gln
         95                 100                 105

aag ata att gct tta cag aat ggg gag cga tct ctg aaa tcg ccc att      506
Lys Ile Ile Ala Leu Gln Asn Gly Glu Arg Ser Leu Lys Ser Pro Ile
    110                 115                 120

cag tcc gac ttg gat gcg ttc cac tcg gga ttt caa aca tgc gcc aaa      554
Gln Ser Asp Leu Asp Ala Phe His Ser Gly Phe Gln Thr Cys Ala Lys
125                 130                 135                 140

gaa gtc ttg caa tac ctc tcc cgg ttt gag agc tgg aca ccc agg gag      602
Glu Val Leu Gln Tyr Leu Ser Arg Phe Glu Ser Trp Thr Pro Arg Glu
                145                 150                 155

ccg cgg tgt gtc cag ctg atc aac cac ttg cac gcc gtg gcc acc cag      650
Pro Arg Cys Val Gln Leu Ile Asn His Leu His Ala Val Ala Thr Gln
            160                 165                 170

ttc ttg ccc acc ccg cag ctg ttg act caa cag gtc cct ctg agc aaa      698
Phe Leu Pro Thr Pro Gln Leu Leu Thr Gln Gln Val Pro Leu Ser Lys
        175                 180                 185

ggc acc ggc gct ccc tcg gcc gcc ggg tcc gcg gcc gcc ccc tgc ctg      746
Gly Thr Gly Ala Pro Ser Ala Ala Gly Ser Ala Ala Ala Pro Cys Leu
    190                 195                 200

gag cgc gcg ggg cag aag ctg gag ccc ctc gcc tac tgc gtg ccc gtc      794
Glu Arg Ala Gly Gln Lys Leu Glu Pro Leu Ala Tyr Cys Val Pro Val
205                 210                 215                 220

atc cag cgg act cag ccc agc gcc gag ctc gcc gcc gag aac gac acg      842
Ile Gln Arg Thr Gln Pro Ser Ala Glu Leu Ala Ala Glu Asn Asp Thr
                225                 230                 235

gac acc gac agc ggc tac ggc ggc gaa gcc gag gcc cgg ccg gac cgc      890
Asp Thr Asp Ser Gly Tyr Gly Gly Glu Ala Glu Ala Arg Pro Asp Arg
            240                 245                 250

gag aaa ggc aaa ggc gcg ggg gcg agc cgc gtc acc atc aag cag gag      938
Glu Lys Gly Lys Gly Ala Gly Ala Ser Arg Val Thr Ile Lys Gln Glu
        255                 260                 265

cct ccc ggg gag gac tcg ccg gcg ccc aag agg atg aag ctg gat tcc      986
Pro Pro Gly Glu Asp Ser Pro Ala Pro Lys Arg Met Lys Leu Asp Ser
    270                 275                 280

cgc ggc ggc ggc agc ggc ggc ggc ccg ggg ggc ggc gcg gcg gcg gcg     1034
Arg Gly Gly Gly Ser Gly Gly Gly Pro Gly Gly Gly Ala Ala Ala Ala
285                 290                 295                 300
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gca gcc gcg ctt ctg ggg ccc gac cct gcc gcc gcg gcc gcg ctg ctg     1082
Ala Ala Ala Leu Leu Gly Pro Asp Pro Ala Ala Ala Ala Ala Leu Leu
            305                 310                 315

aga ccc gac gcc gcc ctg ctc agc tcg ctg gtg gcg ttc ggc gga ggc     1130
Arg Pro Asp Ala Ala Leu Leu Ser Ser Leu Val Ala Phe Gly Gly Gly
        320                 325                 330

gga ggc gcg ccc ttc ccg cag ccc gcg gcc gcc gcg gcc ccc ttc tgc     1178
Gly Gly Ala Pro Phe Pro Gln Pro Ala Ala Ala Ala Ala Pro Phe Cys
    335                 340                 345

ctg ccc ttc tgc ttc ctc tcg cct tct gca gct gcc gcc tac gtg cag     1226
Leu Pro Phe Cys Phe Leu Ser Pro Ser Ala Ala Ala Ala Tyr Val Gln
350                 355                 360

ccc ttc ctg gac aag agc ggc ctg gag aag tat ctg tac ccg gcg gcg     1274
Pro Phe Leu Asp Lys Ser Gly Leu Glu Lys Tyr Leu Tyr Pro Ala Ala
365                 370                 375                 380

gct gcc gcc ccg ttc ccg ctg cta tac ccc ggc atc ccc gcc ccg gcg     1322
Ala Ala Ala Pro Phe Pro Leu Leu Tyr Pro Gly Ile Pro Ala Pro Ala
            385                 390                 395

gca gcc gcg gca gcc gcc gcc gcc gct gcc gcc gcc gcc gcc gcg ttc     1370
Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Phe
        400                 405                 410

ccc tgc ctg tcc tcg gtg ttg tcg ccc cct ccc gag aag gcg ggc gcc     1418
Pro Cys Leu Ser Ser Val Leu Ser Pro Pro Pro Glu Lys Ala Gly Ala
    415                 420                 425

gcc gcc gcg acc ctc ctg ccg cac gag gtg gcg ccc ctt ggg gcg ccg     1466
Ala Ala Ala Thr Leu Leu Pro His Glu Val Ala Pro Leu Gly Ala Pro
430                 435                 440

cac ccc cag cac ccg cac ggc cgc acc cac ctg ccc ttc gcc ggg ccc     1514
His Pro Gln His Pro His Gly Arg Thr His Leu Pro Phe Ala Gly Pro
445                 450                 455                 460

cgc gag ccg ggg aac ccg gag agc tct gct cag gaa gat ccc tcg cag     1562
Arg Glu Pro Gly Asn Pro Glu Ser Ser Ala Gln Glu Asp Pro Ser Gln
            465                 470                 475

cca gga aag gaa gct ccc tgaatccttg cgtcccgaag gacggaggtt            1610
Pro Gly Lys Glu Ala Pro
        480

caagcagagt gagaagttaa aataccctta aggaggttca agcagagtga gaagttaaaa   1670
tacccttaag gtctttaagg gaggaagtgt aatagatgca cgacaggcat aaacaagaac   1730
aacaaaacag gtgttatgtg tacattcgga gttcctgttt tgctcatccc gcaccacccc   1790
accctccaca cactaacatc cctttcttcc ccccaccagc tgtaaaagat cctatgcgaa   1850
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tgagctaggt gaaccccggg gtaggggaaa gatgttaaca cctttgacgt ctttggagtt   2030
gacatggaac agcaggtagt tgttatgtag agctagttct caaagctgcc ctgcctgttt   2090
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gccagaatca ttcctagtac atttgctaac actttattga gaaattgacc atgaattaat   2390
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ccaatctctt gcaagcctcc aggctctggc tttgtctacc tgctcgttcc caatgtatct   3590
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Lys Arg Ser Met Lys Arg Asp Asp Thr Lys Asp Thr Tyr Lys Leu Pro
        35                  40                  45
His Arg Leu Ile Glu Lys Lys Arg Arg Asp Arg Ile Asn Glu Cys Ile
    50                  55                  60
Ala Gln Leu Lys Asp Leu Leu Pro Glu His Leu Lys Leu Thr Thr Leu
65                  70                  75                  80
Gly His Leu Glu Lys Ala Val Val Leu Glu Leu Thr Leu Lys His Leu
                85                  90                  95
Lys Ala Leu Thr Ala Leu Thr Glu Gln Gln His Gln Lys Ile Ile Ala
            100                 105                 110
Leu Gln Asn Gly Glu Arg Ser Leu Lys Ser Pro Ile Gln Ser Asp Leu
        115                 120                 125
Asp Ala Phe His Ser Gly Phe Gln Thr Cys Ala Lys Glu Val Leu Gln
    130                 135                 140
Tyr Leu Ser Arg Phe Glu Ser Trp Thr Pro Arg Glu Pro Arg Cys Val
145                 150                 155                 160
Gln Leu Ile Asn His Leu His Ala Val Ala Thr Gln Phe Leu Pro Thr
                165                 170                 175
Pro Gln Leu Leu Thr Gln Gln Val Pro Leu Ser Lys Gly Thr Gly Ala
            180                 185                 190
Pro Ser Ala Ala Gly Ser Ala Ala Ala Pro Cys Leu Glu Arg Ala Gly
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        195                 200                 205
Gln Lys Leu Glu Pro Leu Ala Tyr Cys Val Pro Val Ile Gln Arg Thr
    210                 215                 220
Gln Pro Ser Ala Glu Leu Ala Ala Glu Asn Asp Thr Asp Thr Asp Ser
225                 230                 235                 240
Gly Tyr Gly Gly Glu Ala Glu Ala Arg Pro Asp Arg Glu Lys Gly Lys
                245                 250                 255
Gly Ala Gly Ala Ser Arg Val Thr Ile Lys Gln Glu Pro Pro Gly Glu
            260                 265                 270
Asp Ser Pro Ala Pro Lys Arg Met Lys Leu Asp Ser Arg Gly Gly Gly
        275                 280                 285
Ser Gly Gly Gly Pro Gly Gly Gly Ala Ala Ala Ala Ala Ala Ala Leu
    290                 295                 300
Leu Gly Pro Asp Pro Ala Ala Ala Ala Ala Leu Leu Arg Pro Asp Ala
305                 310                 315                 320
Ala Leu Leu Ser Ser Leu Val Ala Phe Gly Gly Gly Gly Gly Ala Pro
                325                 330                 335
Phe Pro Gln Pro Ala Ala Ala Ala Ala Pro Phe Cys Leu Pro Phe Cys
            340                 345                 350
Phe Leu Ser Pro Ser Ala Ala Ala Ala Tyr Val Gln Pro Phe Leu Asp
        355                 360                 365
Lys Ser Gly Leu Glu Lys Tyr Leu Tyr Pro Ala Ala Ala Ala Ala Pro
    370                 375                 380
Phe Pro Leu Leu Tyr Pro Gly Ile Pro Ala Pro Ala Ala Ala Ala Ala
385                 390                 395                 400
Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Phe Pro Cys Leu Ser
                405                 410                 415
Ser Val Leu Ser Pro Pro Pro Glu Lys Ala Gly Ala Ala Ala Ala Thr
            420                 425                 430
Leu Leu Pro His Glu Val Ala Pro Leu Gly Ala Pro His Pro Gln His
        435                 440                 445
Pro His Gly Arg Thr His Leu Pro Phe Ala Gly Pro Arg Glu Pro Gly
    450                 455                 460
Asn Pro Glu Ser Ser Ala Gln Glu Asp Pro Ser Gln Pro Gly Lys Glu
465                 470                 475                 480
Ala Pro
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<223> Artificially Synthesized Primer Sequence

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<210> 4
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<212> DNA
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<400> 4
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<210> 5
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<210> 9
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<400> 9
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gcggggtttt tcagtatcta cga 23

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<220>
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<222> (2)...(1453)

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aga gat ttt ata gga ctg gac tat tcc tct ttg tat atg tgt aaa ccc 97
Arg Asp Phe Ile Gly Leu Asp Tyr Ser Ser Leu Tyr Met Cys Lys Pro
20 25 30

aaa agg agc atg aaa cga gac gac acc aag gta agt gat acc tac aaa 145
Lys Arg Ser Met Lys Arg Asp Asp Thr Lys Val Ser Asp Thr Tyr Lys
35 40 45

tta ccg cac aga tta ata gaa aag aaa aga aga gac cga att aat gaa 193
Leu Pro His Arg Leu Ile Glu Lys Lys Arg Arg Asp Arg Ile Asn Glu
50 55 60

tgc att gct cag ctg aaa gat tta ctg cct gaa cat ctg aaa ttg aca 241
Cys Ile Ala Gln Leu Lys Asp Leu Leu Pro Glu His Leu Lys Leu Thr
65 70 75 80

act ctg gga cat ctg gag aaa gct gta gtc ttg gaa tta act ttg aaa 289
Thr Leu Gly His Leu Glu Lys Ala Val Val Leu Glu Leu Thr Leu Lys
85 90 95

cac tta aaa gct tta acc gcc tta acc gag caa cag cat cag aag ata 337
His Leu Lys Ala Leu Thr Ala Leu Thr Glu Gln Gln His Gln Lys Ile
100 105 110

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att gct tta cag aat ggg gag cga tct ctg aaa tcg ccc att cag tcc      385
Ile Ala Leu Gln Asn Gly Glu Arg Ser Leu Lys Ser Pro Ile Gln Ser
        115                 120                 125

gac ttg gat gcg ttc cac tcg gga ttt caa aca tgc gcc aaa gaa gtc      433
Asp Leu Asp Ala Phe His Ser Gly Phe Gln Thr Cys Ala Lys Glu Val
    130                 135                 140

ttg caa tac ctc tcc cgg ttt gag agc tgg aca ccc agg gag ccg cgg      481
Leu Gln Tyr Leu Ser Arg Phe Glu Ser Trp Thr Pro Arg Glu Pro Arg
145                 150                 155                 160

tgt gtc cag ctg atc aac cac ttg cac gcc gtg gcc acc cag ttc ttg      529
Cys Val Gln Leu Ile Asn His Leu His Ala Val Ala Thr Gln Phe Leu
                165                 170                 175

ccc acc ccg cag ctg ttg act caa cag gtc cct ctg agc aaa ggc acc      577
Pro Thr Pro Gln Leu Leu Thr Gln Gln Val Pro Leu Ser Lys Gly Thr
            180                 185                 190

ggc gct ccc tcg gcc gcc ggg tcc gcg gcc gcc ccc tgc ctg gag cgc      625
Gly Ala Pro Ser Ala Ala Gly Ser Ala Ala Ala Pro Cys Leu Glu Arg
        195                 200                 205

gcg ggg cag aag ctg gag ccc ctc gcc tac tgc gtg ccc gtc atc cag      673
Ala Gly Gln Lys Leu Glu Pro Leu Ala Tyr Cys Val Pro Val Ile Gln
    210                 215                 220

cgg act cag ccc agc gcc gag ctc gcc gcc gag aac gac acg gac acc      721
Arg Thr Gln Pro Ser Ala Glu Leu Ala Ala Glu Asn Asp Thr Asp Thr
225                 230                 235                 240

gac agc ggc tac ggc ggc gaa gcc gag gcc cgg ccg gac cgc gag aaa      769
Asp Ser Gly Tyr Gly Gly Glu Ala Glu Ala Arg Pro Asp Arg Glu Lys
                245                 250                 255

ggc aaa ggc gcg ggg gcg agc cgc gtc acc atc aag cag gag cct ccc      817
Gly Lys Gly Ala Gly Ala Ser Arg Val Thr Ile Lys Gln Glu Pro Pro
            260                 265                 270

ggg gag gac tcg ccg gcg ccc aag agg atg aag ctg gat tcc cgc ggc      865
Gly Glu Asp Ser Pro Ala Pro Lys Arg Met Lys Leu Asp Ser Arg Gly
        275                 280                 285

ggc ggc agc ggc ggc ggc ccg ggg ggc ggc gcg gcg gcg gcg gca gcc      913
Gly Gly Ser Gly Gly Gly Pro Gly Gly Gly Ala Ala Ala Ala Ala Ala
    290                 295                 300

gcg ctt ctg ggg ccc gac cct gcc gcc gcg gcc gcg ctg ctg aga ccc      961
Ala Leu Leu Gly Pro Asp Pro Ala Ala Ala Ala Ala Leu Leu Arg Pro
305                 310                 315                 320

gac gcc gcc ctg ctc agc tcg ctg gtg gcg ttc ggc gga ggc gga ggc     1009
Asp Ala Ala Leu Leu Ser Ser Leu Val Ala Phe Gly Gly Gly Gly Gly
                325                 330                 335
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gcg ccc ttc ccg cag ccc gcg gcc gcc gcg gcc ccc ttc tgc ctg ccc 1057
Ala Pro Phe Pro Gln Pro Ala Ala Ala Ala Ala Pro Phe Cys Leu Pro
340 345 350

ttc tgc ttc ctc tcg cct tct gca gct gcc gcc tac gtg cag ccc ttc 1105
Phe Cys Phe Leu Ser Pro Ser Ala Ala Ala Ala Tyr Val Gln Pro Phe
355 360 365

ctg gac aag agc ggc ctg gag aag tat ctg tac ccg gcg gcg gct gcc 1153
Leu Asp Lys Ser Gly Leu Glu Lys Tyr Leu Tyr Pro Ala Ala Ala Ala
370 375 380

gcc ccg ttc ccg ctg cta tac ccc ggc atc ccc gcc ccg gcg gca gcc 1201
Ala Pro Phe Pro Leu Leu Tyr Pro Gly Ile Pro Ala Pro Ala Ala Ala
385 390 395 400

gcg gca gcc gcc gcc gcc gct gcc gcc gcc gcc gcc gcg ttc ccc tgc 1249
Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Phe Pro Cys
405 410 415

ctg tcc tcg gtg ttg tcg ccc cct ccc gag aag gcg ggc gcc gcc gcc 1297
Leu Ser Ser Val Leu Ser Pro Pro Pro Glu Lys Ala Gly Ala Ala Ala
420 425 430

gcg acc ctc ctg ccg cac gag gtg gcg ccc ctt ggg gcg ccg cac ccc 1345
Ala Thr Leu Leu Pro His Glu Val Ala Pro Leu Gly Ala Pro His Pro
435 440 445

cag cac ccg cac ggc cgc acc cac ctg ccc ttc gcc ggg ccc cgc gag 1393
Gln His Pro His Gly Arg Thr His Leu Pro Phe Ala Gly Pro Arg Glu
450 455 460

ccg ggg aac ccg gag agc tct gct cag gaa gat ccc tcg cag cca gga 1441
Pro Gly Asn Pro Glu Ser Ser Ala Gln Glu Asp Pro Ser Gln Pro Gly
465 470 475 480

aag gaa gct ccc tgaatccttg cgtcccgaag gacggaggtt caagcagagt 1493
Lys Glu Ala Pro

gagaagttaa aataccct 1511

<210> 12
<211> 484
<212> PRT
<213> Homo sapiens

<400> 12
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Arg Asp Phe Ile Gly Leu Asp Tyr Ser Ser Leu Tyr Met Cys Lys Pro
20 25 30
Lys Arg Ser Met Lys Arg Asp Asp Thr Lys Val Ser Asp Thr Tyr Lys
35 40 45
Leu Pro His Arg Leu Ile Glu Lys Lys Arg Arg Asp Arg Ile Asn Glu
50 55 60
Cys Ile Ala Gln Leu Lys Asp Leu Leu Pro Glu His Leu Lys Leu Thr

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65                  70                  75                  80
Thr Leu Gly His Leu Glu Lys Ala Val Val Leu Glu Leu Thr Leu Lys
                85                  90                  95
His Leu Lys Ala Leu Thr Ala Leu Thr Glu Gln Gln His Gln Lys Ile
            100                 105                 110
Ile Ala Leu Gln Asn Gly Glu Arg Ser Leu Lys Ser Pro Ile Gln Ser
        115                 120                 125
Asp Leu Asp Ala Phe His Ser Gly Phe Gln Thr Cys Ala Lys Glu Val
    130                 135                 140
Leu Gln Tyr Leu Ser Arg Phe Glu Ser Trp Thr Pro Arg Glu Pro Arg
145                 150                 155                 160
Cys Val Gln Leu Ile Asn His Leu His Ala Val Ala Thr Gln Phe Leu
                165                 170                 175
Pro Thr Pro Gln Leu Leu Thr Gln Gln Val Pro Leu Ser Lys Gly Thr
            180                 185                 190
Gly Ala Pro Ser Ala Ala Gly Ser Ala Ala Ala Pro Cys Leu Glu Arg
        195                 200                 205
Ala Gly Gln Lys Leu Glu Pro Leu Ala Tyr Cys Val Pro Val Ile Gln
    210                 215                 220
Arg Thr Gln Pro Ser Ala Glu Leu Ala Ala Glu Asn Asp Thr Asp Thr
225                 230                 235                 240
Asp Ser Gly Tyr Gly Gly Glu Ala Glu Ala Arg Pro Asp Arg Glu Lys
                245                 250                 255
Gly Lys Gly Ala Gly Ala Ser Arg Val Thr Ile Lys Gln Glu Pro Pro
            260                 265                 270
Gly Glu Asp Ser Pro Ala Pro Lys Arg Met Lys Leu Asp Ser Arg Gly
        275                 280                 285
Gly Gly Ser Gly Gly Gly Pro Gly Gly Gly Ala Ala Ala Ala Ala Ala
    290                 295                 300
Ala Leu Leu Gly Pro Asp Pro Ala Ala Ala Ala Ala Leu Leu Arg Pro
305                 310                 315                 320
Asp Ala Ala Leu Leu Ser Ser Leu Val Ala Phe Gly Gly Gly Gly Gly
                325                 330                 335
Ala Pro Phe Pro Gln Pro Ala Ala Ala Ala Ala Pro Phe Cys Leu Pro
            340                 345                 350
Phe Cys Phe Leu Ser Pro Ser Ala Ala Ala Ala Tyr Val Gln Pro Phe
        355                 360                 365
Leu Asp Lys Ser Gly Leu Glu Lys Tyr Leu Tyr Pro Ala Ala Ala Ala
    370                 375                 380
Ala Pro Phe Pro Leu Leu Tyr Pro Gly Ile Pro Ala Pro Ala Ala Ala
385                 390                 395                 400
Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Phe Pro Cys
                405                 410                 415
Leu Ser Ser Val Leu Ser Pro Pro Pro Glu Lys Ala Gly Ala Ala Ala
            420                 425                 430
Ala Thr Leu Leu Pro His Glu Val Ala Pro Leu Gly Ala Pro His Pro
        435                 440                 445
Gln His Pro His Gly Arg Thr His Leu Pro Phe Ala Gly Pro Arg Glu
    450                 455                 460
Pro Gly Asn Pro Glu Ser Ser Ala Gln Glu Asp Pro Ser Gln Pro Gly
465                 470                 475                 480
Lys Glu Ala Pro
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<210> 13
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<213> Mus musculus

<220>
<221> CDS
<222> (74)...(1303)

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acagccattg aac atg gac gaa gga atc cct cat ttg caa gag aga cag       109
               Met Asp Glu Gly Ile Pro His Leu Gln Glu Arg Gln
                1               5                  10

tta ctg gaa cat agg gat ttt ata gga ctg gac tat tcc tct ttg tat      157
Leu Leu Glu His Arg Asp Phe Ile Gly Leu Asp Tyr Ser Ser Leu Tyr
         15                  20                  25

atg tgt aaa ccc aaa agg agc ttg aag cga gac gat acc aag gat acc      205
Met Cys Lys Pro Lys Arg Ser Leu Lys Arg Asp Asp Thr Lys Asp Thr
     30                  35                  40

tac aag tta ccg cac aga tta ata gaa aag aag aga cga gac cga att      253
Tyr Lys Leu Pro His Arg Leu Ile Glu Lys Lys Arg Arg Asp Arg Ile
 45                  50                  55                  60

aat gaa tgc att gct cag ctg aaa gat tta ctg ccc gaa cat ctg aaa      301
Asn Glu Cys Ile Ala Gln Leu Lys Asp Leu Leu Pro Glu His Leu Lys
                 65                  70                  75

ttg aca aca ctg ggg cat ttg gag aaa gca gta gtc ttg gaa tta act      349
Leu Thr Thr Leu Gly His Leu Glu Lys Ala Val Val Leu Glu Leu Thr
             80                  85                  90

tta aag cac ttg aaa gcg cta aca gcc tta act gag cag cag cat cag      397
Leu Lys His Leu Lys Ala Leu Thr Ala Leu Thr Glu Gln Gln His Gln
         95                  100                 105

aag ata att gct tta cag aat ggg gag cgc tct ctg aaa tcg ccg gtc      445
Lys Ile Ile Ala Leu Gln Asn Gly Glu Arg Ser Leu Lys Ser Pro Val
    110                 115                 120

cag gcc gac ttg gat gcg ttc cac tcg ggg ttt caa acc tgc gcc aaa      493
Gln Ala Asp Leu Asp Ala Phe His Ser Gly Phe Gln Thr Cys Ala Lys
125                 130                 135                 140

gaa gtc ttg caa tac ctc gcg cgc ttt gag agc tgg aca ccc agg gag      541
Glu Val Leu Gln Tyr Leu Ala Arg Phe Glu Ser Trp Thr Pro Arg Glu
                145                 150                 155

ccg cgc tgc gca cag ctc gtc agc cac ctg cat gcc gtg gcc acc cag      589
Pro Arg Cys Ala Gln Leu Val Ser His Leu His Ala Val Ala Thr Gln
            160                 165                 170

ctc ctg acg cca cag gtg ccc tcc ggc agg ggc tct ggg cgc gcg ccc      637
Leu Leu Thr Pro Gln Val Pro Ser Gly Arg Gly Ser Gly Arg Ala Pro
        175                 180                 185

tgc agc gcg ggg gct gcg gcc gcc tcg ggt ccc gag cgc gtc gcc cgc      685
```

```
Cys Ser Ala Gly Ala Ala Ala Ala Ser Gly Pro Glu Arg Val Ala Arg
    190                 195                 200

tgc gtg ccg gtc atc cag cgg act cag ccc ggc acg gag ccg gaa cac      733
Cys Val Pro Val Ile Gln Arg Thr Gln Pro Gly Thr Glu Pro Glu His
205                 210                 215                 220

gac acg gac acc gac agc ggc tac gga ggc gag gcg gag cag ggc cgc      781
Asp Thr Asp Thr Asp Ser Gly Tyr Gly Gly Glu Ala Glu Gln Gly Arg
                225                 230                 235

gcg gcc gtc aag cag gag cca ccc ggg gac tcg tcg cct gcg ccc aag      829
Ala Ala Val Lys Gln Glu Pro Pro Gly Asp Ser Ser Pro Ala Pro Lys
            240                 245                 250

agg ccg aag ctg gag gcg cgc ggc gcg ctc ctg ggc ccg gag ccc gcg      877
Arg Pro Lys Leu Glu Ala Arg Gly Ala Leu Leu Gly Pro Glu Pro Ala
        255                 260                 265

ctg ctc ggc tcg ctc gtg gcg ctt ggc ggg ggc gcg ccc ttc gcg cag      925
Leu Leu Gly Ser Leu Val Ala Leu Gly Gly Gly Ala Pro Phe Ala Gln
    270                 275                 280

ccc gct gcc gcg ccc ttc tgc ctg ccc ttc tat ctg ctg tcg ccg tcc      973
Pro Ala Ala Ala Pro Phe Cys Leu Pro Phe Tyr Leu Leu Ser Pro Ser
285                 290                 295                 300

gcc gcc gcc tac gta cag ccc tgg cta gac aag agc ggc ctg gac aag     1021
Ala Ala Ala Tyr Val Gln Pro Trp Leu Asp Lys Ser Gly Leu Asp Lys
                305                 310                 315

tat ctg tac ccc gcg gcg gcc gcg ccc ttc ccg ctg ctg tat ccc ggc     1069
Tyr Leu Tyr Pro Ala Ala Ala Ala Pro Phe Pro Leu Leu Tyr Pro Gly
            320                 325                 330

atc cca gca gcg gcc gcc gct gct gct gcc gcc gct ttc cct tgc ttg     1117
Ile Pro Ala Ala Ala Ala Ala Ala Ala Ala Ala Phe Pro Cys Leu
        335                 340                 345

tcg tcc gtg ctg tcg cca ccc ccg gag aag gcc ggc gcg acc gcc ggt     1165
Ser Ser Val Leu Ser Pro Pro Pro Glu Lys Ala Gly Ala Thr Ala Gly
    350                 355                 360

gcc ccg ttc ctg gcg cac gag gtg gcg ccc ccg ggg ccg ctg cgc ccc     1213
Ala Pro Phe Leu Ala His Glu Val Ala Pro Pro Gly Pro Leu Arg Pro
365                 370                 375                 380

cag cac gcg cat agc cgc acc cac ctg ccg cgc gct gtg aac ccg gag     1261
Gln His Ala His Ser Arg Thr His Leu Pro Arg Ala Val Asn Pro Glu
                385                 390                 395

agc tct cag gaa gat gcc acg cag ccg gcc aag gac gcc ccc              1303
Ser Ser Gln Glu Asp Ala Thr Gln Pro Ala Lys Asp Ala Pro
            400                 405                 410

tgaacccagc attccttcca gaacagggca gggggctccc gaggagtcgc cgggtttcca   1363
agttcaaacg tcctctaaag cgtgccaggg aggaagagta agcgatgctc gacaggct     1421
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<210> 14
<211> 410
<212> PRT
<213> Mus musculus

<400> 14

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Met Asp Glu Gly Ile Pro His Leu Gln Glu Arg Gln Leu Leu Glu His
 1               5                  10                  15
Arg Asp Phe Ile Gly Leu Asp Tyr Ser Ser Leu Tyr Met Cys Lys Pro
            20                  25                  30
Lys Arg Ser Leu Lys Arg Asp Asp Thr Lys Asp Thr Tyr Lys Leu Pro
        35                  40                  45
His Arg Leu Ile Glu Lys Lys Arg Arg Asp Arg Ile Asn Glu Cys Ile
    50                  55                  60
Ala Gln Leu Lys Asp Leu Leu Pro Glu His Leu Lys Leu Thr Thr Leu
65                  70                  75                  80
Gly His Leu Glu Lys Ala Val Val Leu Glu Leu Thr Leu Lys His Leu
                85                  90                  95
Lys Ala Leu Thr Ala Leu Thr Glu Gln Gln His Gln Lys Ile Ile Ala
            100                 105                 110
Leu Gln Asn Gly Glu Arg Ser Leu Lys Ser Pro Val Gln Ala Asp Leu
        115                 120                 125
Asp Ala Phe His Ser Gly Phe Gln Thr Cys Ala Lys Glu Val Leu Gln
    130                 135                 140
Tyr Leu Ala Arg Phe Glu Ser Trp Thr Pro Arg Glu Pro Arg Cys Ala
145                 150                 155                 160
Gln Leu Val Ser His Leu His Ala Val Ala Thr Gln Leu Leu Thr Pro
                165                 170                 175
Gln Val Pro Ser Gly Arg Gly Ser Gly Arg Ala Pro Cys Ser Ala Gly
            180                 185                 190
Ala Ala Ala Ala Ser Gly Pro Glu Arg Val Ala Arg Cys Val Pro Val
        195                 200                 205
Ile Gln Arg Thr Gln Pro Gly Thr Glu Pro Glu His Asp Thr Asp Thr
    210                 215                 220
Asp Ser Gly Tyr Gly Gly Glu Ala Glu Gln Gly Arg Ala Ala Val Lys
225                 230                 235                 240
Gln Glu Pro Pro Gly Asp Ser Ser Pro Ala Pro Lys Arg Pro Lys Leu
                245                 250                 255
Glu Ala Arg Gly Ala Leu Leu Gly Pro Glu Pro Ala Leu Leu Gly Ser
            260                 265                 270
Leu Val Ala Leu Gly Gly Gly Ala Pro Phe Ala Gln Pro Ala Ala Ala
        275                 280                 285
Pro Phe Cys Leu Pro Phe Tyr Leu Leu Ser Pro Ser Ala Ala Ala Tyr
    290                 295                 300
Val Gln Pro Trp Leu Asp Lys Ser Gly Leu Asp Lys Tyr Leu Tyr Pro
305                 310                 315                 320
Ala Ala Ala Ala Pro Phe Pro Leu Leu Tyr Pro Gly Ile Pro Ala Ala
                325                 330                 335
Ala Ala Ala Ala Ala Ala Ala Ala Phe Pro Cys Leu Ser Ser Val Leu
            340                 345                 350
Ser Pro Pro Pro Glu Lys Ala Gly Ala Thr Ala Gly Ala Pro Phe Leu
        355                 360                 365
Ala His Glu Val Ala Pro Pro Gly Pro Leu Arg Pro Gln His Ala His
    370                 375                 380
Ser Arg Thr His Leu Pro Arg Ala Val Asn Pro Glu Ser Ser Gln Glu
385                 390                 395                 400
```

Asp Ala Thr Gln Pro Ala Lys Asp Ala Pro
405 410

<210> 15
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Artificially Synthesized Primer Sequence

<400> 15
aaaatctctc caggcgaccg t 21

<210> 16
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Artificially Synthesized Primer Sequence

<400> 16
agcctgtcga gcatcgctta 20

<210> 17
<211> 412
<212> PRT
<213> Homo sapiens

<400> 17
Met Glu Arg Ile Pro Ser Ala Gln Pro Pro Pro Ala Cys Leu Pro Lys
1 5 10 15
Ala Pro Gly Leu Glu His Gly Asp Leu Pro Gly Met Tyr Pro Ala His
20 25 30
Met Tyr Gln Val Tyr Lys Ser Arg Arg Gly Ile Lys Arg Ser Glu Asp
35 40 45
Ser Lys Glu Thr Tyr Lys Leu Pro His Arg Leu Ile Glu Lys Lys Arg
50 55 60
Arg Asp Arg Ile Asn Glu Cys Ile Ala Gln Leu Lys Asp Leu Leu Pro
65 70 75 80
Glu His Leu Lys Leu Thr Thr Leu Gly His Leu Glu Lys Ala Val Val
85 90 95
Leu Glu Leu Thr Leu Lys His Val Lys Ala Leu Thr Asn Leu Ile Asp
100 105 110
Gln Gln Gln Gln Lys Ile Ile Ala Leu Gln Ser Gly Leu Gln Ala Gly
115 120 125
Glu Leu Ser Gly Arg Asn Val Glu Thr Gly Gln Glu Met Phe Cys Ser
130 135 140
Gly Phe Gln Thr Cys Ala Arg Glu Val Leu Gln Tyr Leu Ala Lys His
145 150 155 160
Glu Asn Thr Arg Asp Leu Lys Ser Ser Gln Leu Val Thr His Leu His
165 170 175
Arg Val Val Ser Glu Leu Leu Gln Gly Gly Thr Ser Arg Lys Pro Ser
180 185 190

```
Asp Pro Ala Pro Lys Val Met Asp Phe Lys Glu Lys Pro Ser Ser Pro
        195                 200                 205
Ala Lys Gly Ser Glu Gly Pro Gly Lys Asn Cys Val Pro Val Ile Gln
    210                 215                 220
Arg Thr Phe Ala His Ser Ser Gly Glu Gln Ser Gly Ser Asp Thr Asp
225                 230                 235                 240
Thr Asp Ser Gly Tyr Gly Gly Glu Ser Glu Lys Gly Asp Leu Arg Ser
                245                 250                 255
Glu Gln Pro Cys Phe Lys Ser Asp His Gly Arg Arg Phe Thr Met Gly
            260                 265                 270
Glu Arg Ile Gly Ala Ile Lys Gln Glu Ser Glu Glu Pro Pro Thr Lys
        275                 280                 285
Lys Asn Arg Met Gln Leu Ser Asp Asp Glu Gly His Phe Thr Ser Ser
    290                 295                 300
Asp Leu Ile Ser Ser Pro Phe Leu Gly Pro His Pro His Gln Pro Pro
305                 310                 315                 320
Phe Cys Leu Pro Phe Tyr Leu Ile Pro Pro Ser Ala Thr Ala Tyr Leu
                325                 330                 335
Pro Met Leu Glu Lys Cys Trp Tyr Pro Thr Ser Val Pro Val Leu Tyr
            340                 345                 350
Pro Gly Leu Asn Ala Ser Ala Ala Ala Leu Ser Ser Phe Met Asn Pro
        355                 360                 365
Asp Lys Ile Ser Ala Pro Leu Leu Met Pro Gln Arg Leu Pro Ser Pro
    370                 375                 380
Leu Pro Ala His Pro Ser Val Asp Ser Ser Val Leu Leu Gln Ala Leu
385                 390                 395                 400
Lys Pro Ile Pro Pro Leu Asn Leu Glu Thr Lys Asp
                405                 410
```

<210> 18
<211> 253
<212> PRT
<213> Rattus norvegicus

<400> 18

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Met Asp Glu Gly Ile Pro His Leu Gln Glu Arg Gln Leu Leu Glu His
 1               5                  10                  15
Arg Asp Phe Ile Gly Leu Asp Tyr Ser Ser Leu Tyr Met Cys Lys Pro
            20                  25                  30
Lys Arg Ser Leu Lys Arg Asp Asp Thr Lys Asp Thr Tyr Lys Leu Pro
        35                  40                  45
His Arg Leu Ile Glu Lys Lys Arg Arg Asp Arg Ile Asn Glu Cys Ile
    50                  55                  60
Ala Gln Leu Lys Asp Leu Leu Pro Glu His Leu Lys Leu Thr Thr Leu
65                  70                  75                  80
Gly His Leu Glu Lys Ala Val Val Leu Glu Leu Thr Leu Lys His Leu
                85                  90                  95
Lys Ala Leu Thr Ala Leu Thr Glu Gln Gln His Gln Lys Ile Ile Ala
            100                 105                 110
Leu Gln Asn Gly Glu Arg Ser Leu Lys Ser Pro Val Gln Ala Asp Leu
        115                 120                 125
Asp Ala Phe His Ser Gly Phe Gln Thr Cys Ala Lys Glu Val Leu Gln
    130                 135                 140
Tyr Leu Ala Arg Phe Glu Ser Trp Thr Pro Arg Glu Pro Arg Cys Ala
145                 150                 155                 160
Gln Leu Val Ser His Leu His Ala Val Ala Thr Gln Leu Leu Thr Pro
                165                 170                 175
```

```
Gln Val Thr Pro Gly Arg Gly Pro Gly Arg Ala Pro Cys Ser Ala Gly
            180                 185                 190
Ala Ala Ala Ala Ser Gly Ser Glu Arg Val Ala Arg Cys Val Pro Val
        195                 200                 205
Ile Gln Arg Thr Gln Pro Gly Thr Glu Pro Glu His Asp Thr Asp Thr
    210                 215                 220
Asp Ser Gly Tyr Gly Gly Glu Ala Glu Gln Gly Arg Ala Ala Val Lys
225                 230                 235                 240
Gln Glu Pro Pro Gly Asp Pro Ser Leu Arg Pro Arg Gly
                245                 250
```